



KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS

AS 201: Financial Mathematics Term 221 – Fall 2022

Instructor: Dr. Kroumi Dhaker
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 Office Hours: MW 2:00 PM – 4:00 PM or by appointment
 Time: UTR 3:00 PM – 4:00 PM
 Place: Building 6 – Room 103

Prerequisite: Math 102
 Credit Hours: (3-0-3)

Textbook: Broverman, S.A., Mathematics of Investment and Credit (Fifth Edition), 2010, ACTEX Publications, ISBN 978-1-56698-767-7.

Calculator: Texas BA II Plus Calculator or Texas BA II Professional

Additional References

- 1) Daniel, J.W., and Vaaler, L.J.F., Mathematical Interest Theory (Second Edition), 2009, The Mathematical Association of America, ISBN: 978-0883857540. 6.
- 2) Kellison, S.G., The Theory of Interest (Third Edition), 2009, Irwin/McGraw-Hill, ISBN: 125921544X or 978-1259215445.

Course Description:

Theory of compound interest and the mathematics of investment and credit. Measurement of interest, annuities certain (level, non-level, and continuous), amortization schedules, sinking funds, investment yield rates, and valuation of bonds and other securities. Methods of loan measurement and payments (Islamic and Conventional) are illustrated in amortization and sinking fund schedules. Islamic views on interest and investments.

Grading Policy:

	Date	Time	Place	Materials	Percentage
Exam I	TBA	TBA	TBA	(Chapters 1 & 2)	22%
Exam II	TBA	TBA	TBA	(Chapters 3, 4, & 5)	23%
Final Exam	TBA	TBA	TBA	Comprehensive	35%
Absences+Homeworks					2+8%
Class Work	It is based on quizzes, class tests or other class activities determined by the instructor.				10%

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Communication:

- For regular announcements, students are advised to check Blackboard regularly.
- Students are required to carry **pens, note-taking equipment and a calculator to EVERY lecture, quizzes, and exams**. It is strongly recommended to keep a **binder** for class-notes.
- Students are also expected to take class notes and organize their learning material in a binder for easy retrieval to help them in study and review for class, exams, etc.
- It is to the student's advantage to keep a binder for storing class notes, homework, and other graded assignments.
 - Students who are organized will find it easier to find important materials when studying for exams.
- To successfully learn financial mathematics, students MUST **solve problems** and **analyze data**. The selected assigned problems are specifically designed to prepare you for class quizzes, lab, majors and final exam. So, it is expected that you complete these problems **step-by-step** and **with comprehension**. If you happen to stumble upon a solution manual somewhere, remember 2 important points. (1) these solutions are brief and may have mistakes and (2) you are expected in your career as an actuary and your exams and quizzes in this class to know every step to a problem and to know when a solution is incorrect. Thus, the best way to solve problem is without these brief solutions
- Never round your intermediate results to problems when doing your calculations. This will cause you to lose calculation accuracy. Round only your final answers and you should not round less than 4 decimal places unless required otherwise.
- For every exam, so you need to bring with you pens, pencils, a sharpener, an eraser, and a calculator

Academic Integrity: All KFUPM policies regarding ethics and academic honesty apply to this course.

Important Attendance Notes:

- In accordance with University rules, **9 (NINE) unexcused absences** or **12 (TWELVE) excused-unexcused absences** will automatically result in a grade of **DN**.
- Attendance on time is very important. Mostly, attendance will be checked within the first five minutes of the class. Entering the class after that, is considered as one late, and every two times late equals to one absence. The student has to be available until the end of the class.

Home Work Problems:

- ✓ Handout problems will be posted on the BLACKBOARD towards the end of each chapter.
- ✓ The **Homework** should be submitted **IN TIME**. No late homework will be accepted

Student Learning Outcomes: (Consistent with SOA professional exam FM objectives).

See <https://www.soa.org/education/exam-req/edu-exam-fm-detail.aspx>

Cheating in Exams:

Cheating or any attempt of cheating by use of illegal activities, techniques and forms of fraud will result in a grade of **DN** in the course along with reporting the incident to the higher university administration. Cheating in exams includes (but is not limited to)

- Looking at the papers of other students
- Talking to other students
- Using mobiles or any other electronic devices **including Smart Watch**

Missing an Exam: In case a student misses an exam (Exam I, Exam II, or the Final Exam) for a legitimate reason (such as medical emergencies), she/he must bring an official excuse from Students Affairs. Otherwise, she/he will get zero in the missed exam.

The Usage of Mobiles in Class: Students are not allowed to use mobiles for any purpose during class time. Students who want to use electronic devices to take notes must take permission from their instructor. Violations of these rules will result in a penalty decided by the instructor.

Grading:

Your course grade will be based on the total of points accumulated on class work two major exams, and Final Exam. The following scale gives the cut-off points for the course grades.

Letter grade	A+	A	B+	B	C+	C	D+	D	F	DN
Cut-off	90%	85%	80%	75%	67%	60%	55%	50%	<50%	≥ 9

Syllabus – A rough weekly guideline

Week #	Date	Section	Material	Notes
1	Aug 28 – Sep 01	Chapter 1 1.1 1.2	Interest rate Measurement Interest Accumulation and Effective Rates of Interest Present Value (excluding 1.2.1)	
2	Sep 04 – Sep 08	1.3 1.4 1.5	Equation of Value Nominal rates of Interest Effective and Nominal Rates of Discount	
3	Sep 11 – Sep 15	1.6 1.7 2.1	The force of Interest Inflation and the “Real” rate of Interest Level Payment Annuities	
4	Sep 18 – Sep 22	Chapter 2 2.1 Cont. 2.2	Valuation of Annuities Level Payment Annuities Level payment Annuities – Some Generalizations	
	Sep 22	Thursday, National Day Holiday		
5	Sep 25 – Sep 29	2.3 2.4	Annuities with Non-Constant payment Applications and Illustrations (excluding 2.4.2 & 2.4.3)	
6	Oct 02 – Oct 06	Chapter 3 3.1 3.2 3.3	Loan Repayment The amortization model of Loan Repayment Amortization of a Loan with Level Payments (excluding 3.2.1 & 3.2.2) The sinking Fund Method of Loan Repayment	1st Major Exam (chapters 1& 2)
7	Oct 09 – Oct 13	Chapter 4 4.1 4.2 4.3	Bond Valuation Determination of Bond Prices Amortization of a Bond Applications and Illustrations (excluding 4.3.2)	
8	Oct 16 – Oct 20	Chapter 5 5.1 5.2 5.3	Measuring the Rate of Return of an Investment Internal Rate of Return defined and Net Present Value (excluding 5.1.4)	

			Dollar-weighted and Time-Weighted Rate of return Applications and Illustrations (excluding the investment year portion of 5.3.1, 5.3.2 & 5.3.3)	
9	Oct 23 – Oct 27	Chapter 6 6.1 6.3	The term structure of interest rates Spot Rates of Interest Forward rates of Interest	
10	Oct 30 – Nov 03	Chapter 7 7.1	Cash flow duration and Immunization Duration of a set of Cash flows and Bond duration (excluding 7.1.6)	2-nd Major Exam (chapters 3, 4, & 5)
11	Nov 06 – Nov 10	7.2 Chapter 8 8.1	Asset-liability Matching and Immunization Additional Topics in Finance and Investment. The dividend discount model of stock valuation	
12	Nov 13 – Nov 17	SOA Exam FM Note	Using Duration and Convexity to approximate change in present value.	
13	Nov 20 – Nov 24	SOA Exam FM Note	Interest Rate Swaps	
14	Dec 04 – Dec 08	SOA Exam FM Note	Determinants of Interest rates	
15	Dec 11 – Dec 15		Review \ Exam FM Practice Problems	
16	Dec 18		Revision	Normal Thursday Class
Final Exam (Comprehensive): As posted on the Registrar Website				